REMARKS

Applicants have amended claim 1, without prejudice or disclaimer, to differently recite the invention. Claims 1-4 are now pending.

In the Office Action, the Examiner rejected claims 1-4 under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement; and rejected claims 1-4 under 35 U.S.C. 103(a) as being unpatentable over Kozodoy et al. (U.S. Patent No. 6,265,727) or Starikov et al. (U.S. Patent No. 6,608,360). Applicants traverse these rejections, at least for the following reasons.

Applicants traverse the rejection of items 1-4 under 35 U.S.C. 112, first paragraph. The Examiner's position with respect to this rejection appears to be that the recitation in claim 1 stating that "each energy gap of said n-type nitride semiconductor layer and p-type nitride semiconductor layer is equal to or larger than the energy gap of said photoabsorption layer" is not disclosed in the specification. In response, Applicants respectfully point out to the Examiner that at page 12, lines 2-5, the specification discloses that "the energy gap of the n-type contact layer and p-type contact layer is selected to be equal to the energy gap of the photoabsorption layer, or preferably larger than that." Thus, Applicants submit that there is support in the specification for the language in question. Moreover, the claim language at issue has now been amended in a manner that is also supported by the specification. Accordingly, reconsideration and withdrawal of the rejection under 35 U.S.C. 112, first paragraph, is respectfully requested.

Applicants traverse the rejections based on prior art at least because the applied references of record do not disclose or suggest any of Applicants' claimed combinations wherein

each energy gap of said n-type nitride semiconductor layer and p-type nitride semiconductor layer is larger than the energy gap of said photoabsorption layer.

In this connection, Applicants submit that the UV sensor in Kozodoy et al. is apparently alleged to comprise: an incident light window (52) constituting part of the wall of a container (51); and a pin-type photodiode (40) disposed inside container (51) and employed for photoelectrically converting light that was transmitted through incident light window (52), wherein incident light window (52) is composed of a glass, and pin-type photodiode (40) comprises a photoabsorption layer (i-type layer) formed from $In_xGa_{(1-x)}N$ ($0 < x < 1$) between an n-type nitride semiconductor layer and a p-type nitride semiconductor layer. Assuming, for the sake of discussion, that this characterization is correct, Applicants submit that each energy gap of the n-type nitride semiconductor layer and p-type nitride semiconductor layer in Kozodoy et al. is smaller than the energy gap of the photoabsorption layer.

Thus, although the Office Action states at page 4, lines 7-8, that "Kozodoy also discloses that the energy gap of the active region is at least equal to one or both of the n or p-type regions," Applicants submit that this characterization of Kozodoy et al. is most certainly not correct. Rather than disclosing that each energy gap of the n-type nitride semiconductor layer and p-type semiconductor layer is larger than the energy gap of the photoabsorption layer, as now recited in Applicants' claim 1, Kozodoy et al. instead discloses at column 4, lines 30-31, that "one or both of their p and n-type region bandgaps remain smaller [than] the i-region bandgap." (Underlining added; bracketed subject matter inserted to replace an apparent typographical error.) In other words, as reflected in claim 1 of Kozodoy et al., Kozodoy et al. relates to an "i-region having a

larger bandgap than one or both of said p-type and n-type regions" (column 9, lines 1 and 2 of Kozodoy et al.), which is very different than the recitation set forth in Applicants' claim 1.

The reason why p-type and n-type regions have smaller bandgaps than the i-type region in Kozodoy et al. is explained in the "Summary of the Invention" of the Kozodoy et al. patent, column 3, lines 6-44 of Kozodoy et al., which states that:

> "The present invention is a novel photodiode that can be tailored to detect different wavelengths of light but is particularly useful in detecting in the solar blind spectral region. The photodiode employs an inverted heterostructure p-i-n design where one or both of the p and n-type regions have a smaller bandgap than the active i-region. The smaller bandgap region which receives the light incident on the structure, is grown thin enough to allow the majority of light energy to pass through to the active i-region for detection. The present invention is a truly solar blind photodiode that operates without external filters.
>
> The new photodiode structure circumvents a number of materials and design related problems associated with the fabrication of short wavelength photodetectors. By having one or both of the p and n-type regions of smaller bandgap than the i-region, the invention allows for the fabrication of true solar-blind photodiodes while minimizing the need for highly-doped, wide bandgap p or no-type regions. The invention avoids the growth and doping problems, lattice mismatch strain, and degraded performance associated with highly doped, wide bandgap semiconductor material.
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> To achieve true solar blind detection, the new photodiode can be fabricated using group III nitride alloys including, but not limited to, GaN, AlGaN, InGaN, and AlInGaN,

with the specific composition of the constituent layers selected so as to achieve the desired bandgaps of the various regions. However, other semiconductor and doping materials can be used in different combinations and proportions to create photodiodes responsive to different wavelengths. An example of the new p-i-n photodiode structure is GaN-based with Al or Al and In added to the intrinsic or lightly doped GaN active i-region in amounts that make the region responsive to wavelengths less than approximately 300 nm, with the surrounding p and n-type regions having bandgaps at least 10% smaller than that of the i-region. The light incident region (usually the p-type region) is grown thin enough that the majority of light passes through to the active i-region." (Underlinings added.)

This teaching of Kozodoy et al. is in direct contrast to the recitation in Applicants' claim 1, which provides that each energy gap of the n-type nitride semiconductor layer and p-type nitride semiconductor layer is larger than the energy gap of the photoabsorption layer. Thus, it is clear that Kozodoy et al., rather than disclosing or suggesting the present invention, instead teaches away from it. And since Kozodoy et al. teaches away from the present invention, any *prima facie* case of obviousness that the Examiner may be attempting to make is rebutted.

Starikov et al. discloses a similar UV sensor as that taught by Kozodoy et al. Thus, Applicants submit that Starikov et al. suffers from essentially the same deficiencies as Kozodoy et al. and does not show the energy band gap relationships recited in Applicants' independent claim 1.

Applicants' specification states at page 2, lines 1-6, that "it is difficult to detect selectively only the UV radiation with a wavelength close to 365 nm. * * * It is an object of

the present invention to provide UV sensor for selectively detecting only the light with a wavelength close to 365 nm." Applicants submit that the combination of the use of borosilicate glass and the specific energy bandgap relationships recited in Applicants' independent claim 1 provides a solution to this type of problem, and that such a combination is neither disclosed nor suggested by either of Kozodoy et al. or Starikov et al.

Further, the Examiner asserts in the Office Action that combining borosilicate glass with a predetermined thickness (200 nm or more) with the UV sensor of either Kozodoy et al. or Starikov et al. would have been obvious under the authority of *In re Rose,* 105 USPQ 237 (CCPA 1995) and *In re Aller* (105 USPQ 233). Applicants traverse this assertion by the Examiner at least because these cases relate to numerical limitations such as the size or range of an object, and therefore these authorities do not support the proposition upon which the Examiner is apparently relying.

In conclusion, the establishment of a *prima facie* case of obviousness requires a showing of a suggestion or motivation to modify or combine the applied prior art teachings, a reasonable expectation of success, and a teaching or suggestion of each and every claim limitation by the modified prior art reference (or references when combined). M.P.E.P. § 2143, citing *In re Vaeck*, 947 F.2d 488 (Fed. Cir. 1991). The motivation or suggestion to modify or combine prior art teachings cannot come from the applicant's own disclosure. Instead, the teachings from the prior art itself must have suggested the claimed subject matter to one of ordinary skill in the art. *In re Rinehart*, 531 F.2d 1048, 1051 (C.C.P.A. 1976).

Applicants submit that the Examiner has not established a *prima facie* case of obviousness in the present case at least because no motivation for the proposed combination is

disclosed. And, perhaps more importantly, the Examiner has not established a *prima facie* case of obviousness in the present case at least because the prior art teaches away from the claimed invention. *In re Dow Chemical Co.*, 837 F.2d 469 (Fed. Cir. 1988). As discussed above, not only does Kozodoy et al. not teach or suggest the combination recited in claim 1 wherein "each energy gap of the n-type nitride semiconductor layer and p-type nitride semiconductor layer is larger than the energy gap of the photoabsorption layer," to the contrary, Kodozoy et al. teaches away from this recited combination. Moreover, Starikov et al. cannot make up for this deficiency in Kodozoy et al. For at least these reasons, Applicants submit that the applied references to Kodozoy et al. and Starikov et al., whether taken alone or in combination, do not disclose or suggest the combinations recited in independent claim 1 or its dependent claims 2-4.

Accordingly, reconsideration and withdrawal of the pending rejections based on the prior art are respectfully requested.

CONCLUSION

In view of the foregoing, Applicants submit that the pending claims are in condition for allowance, and respectfully request withdrawal of all outstanding objections and rejection, and request the timely allowance of the pending claims. Should the Examiner feel that there are any issues outstanding after consideration of this response, the Examiner is invited to contact Applicant's undersigned representative to expedite prosecution. A favorable action is awaited.

EXCEPT for issue fees payable under 37 C.F.R. § 1.18, the Commissioner is hereby authorized by this paper to charge any additional fees during the entire pendency of this application including fees due under 37 C.F.R. § 1.16 and 1.17 which may be required, including

any required extension of time fees, or credit any overpayment to Deposit Account No. 50-0573.

This paragraph is intended to be a **CONSTRUCTIVE PETITION FOR EXTENSION OF TIME** in accordance with 37 C.F.R. § 1.136(a)(3).

Respectfully submitted,

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By: _____

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